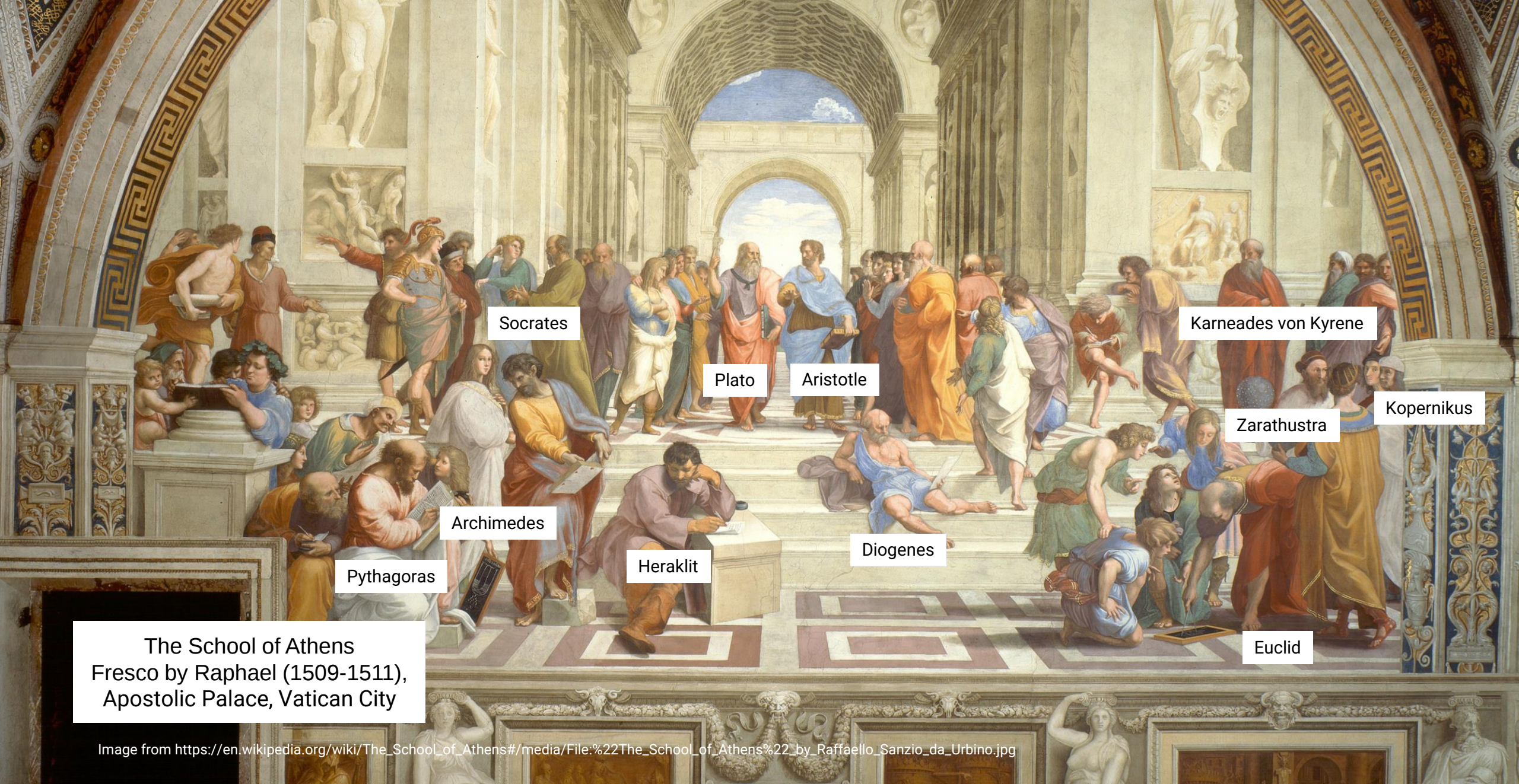




Research & Evaluations in HCI

Human-Computer Interaction Exercise





Socrates

Karneades von Kyrene

Plato

Aristotle

Zarathustra

Kopernikus

Archimedes

Diogenes

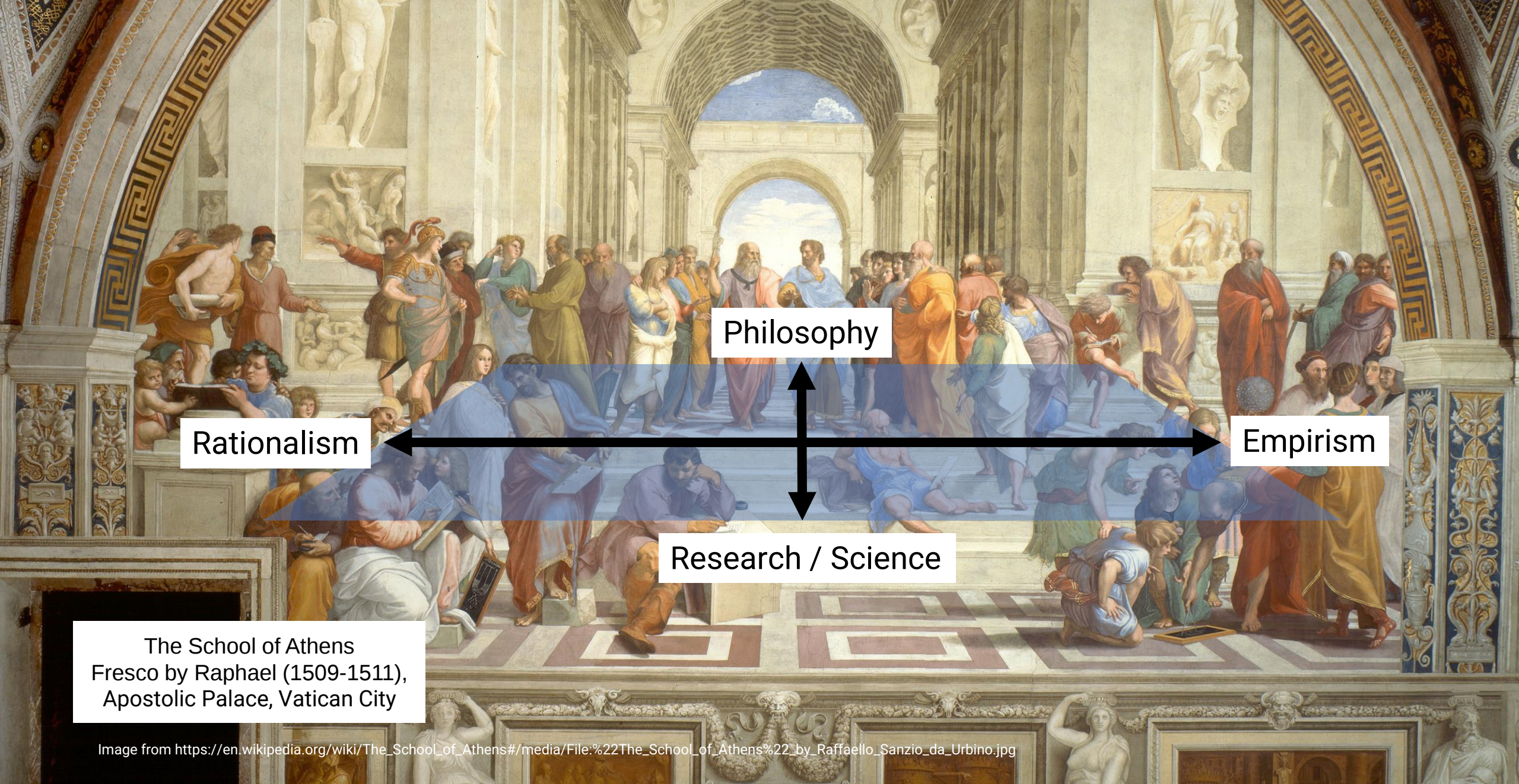
Pythagoras

Heraklit

Euclid

The School of Athens
Fresco by Raphael (1509-1511),
Apostolic Palace, Vatican City

Image from https://en.wikipedia.org/wiki/The_School_of_Athens#/media/File:%22The_School_of_Athens%22_by_Raffaello_Sanzio_da_Urbino.jpg



Rationalism

Philosophy

Empiricism

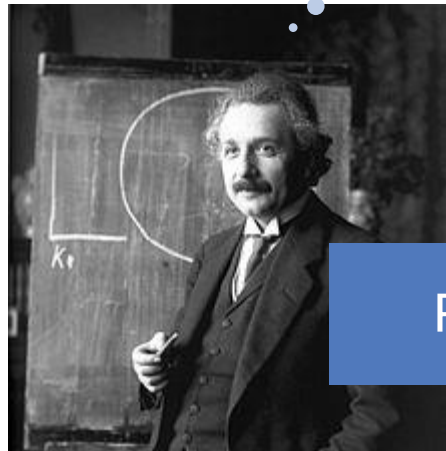
Research / Science

The School of Athens
Fresco by Raphael (1509-1511),
Apostolic Palace, Vatican City

Image from https://en.wikipedia.org/wiki/The_School_of_Athens#/media/File:%22The_School_of_Athens%22_by_Raffaello_Sanzio_da_Urbino.jpg

Circle of Science

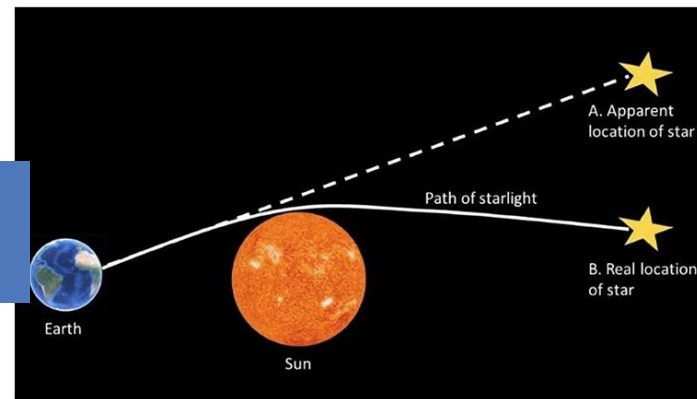
$$E = mc^2$$



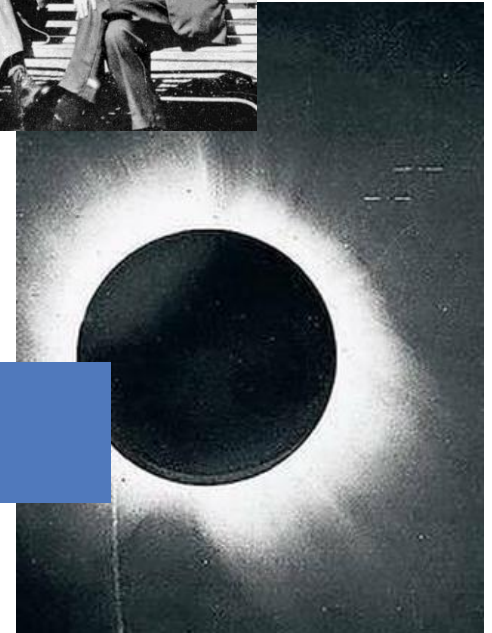
reasonable thinking
as source of
knowledge

Rationalism

confirmed by



Empirism



sensory experience
as source of
knowledge

confirmed by?

Image from <https://kids.frontiersin.org/articles/10.3389/frym.2022.747040>



Free axe image, public domain equipment CC0 photo. <https://www.rawpixel.com/image/5914225/image-public-domain-leaves-green>

Evaluating an axe

- *“If you want to evaluate a tool, say an axe, you might study the design of the bit, the weight distribution, the steel alloy used, the grade of hickory in the handle, etc., or you may just study the kind and speed of the cuts it makes in the hands of a good axeman.” [1]*
- **Rationalists (Analysts)** model the design characteristics and predict their impact
 - › “How the handle must be designed to cut well?”
- **Empirics (Observers)** measure the impact and understand the context
 - › “If we change the handle, does it still cut well?”

[1] Scriven, M. (2013). Conceptual revolutions in evaluation. Evaluation roots, SAGE Publications, 167-179.

What are evaluations?

- Evaluation is a **systematic determination and assessment** of a subject's merit, worth and significance, using criteria governed by a set of standards
 - › The **application of scientific methods** to assess the **design, implementation, improvement, or outcomes of a subject** [1]
 - › A **critical assessment** to which extent a service or component fulfills stated goals [2]
 - › A **study to assist the assessment** of an object's merit and worth [3]
- Can demonstrate a system's impact
- Assessment to improve the system design and implementation

[1] Ross, P.H.; Ellipse, M.W.; Freeman, H.E. (2004). Evaluation: A systematic approach (7th ed.). Thousand Oaks: Sage. ISBN 978-0-7619-0894-4.

[2] Scriven, M. (2013). Conceptual revolutions in evaluation. Evaluation roots, SAGE Publications, 167-179.

[3] Reeve, J; Paperboy, D. (2007). "Evaluating the evaluation: Understanding the utility and limitations of evaluation as a tool for organizational learning". Health Education Journal. 66 (2): 120–131. [doi:10.1177/0017896907076750](https://doi.org/10.1177/0017896907076750). S2CID 73248087.

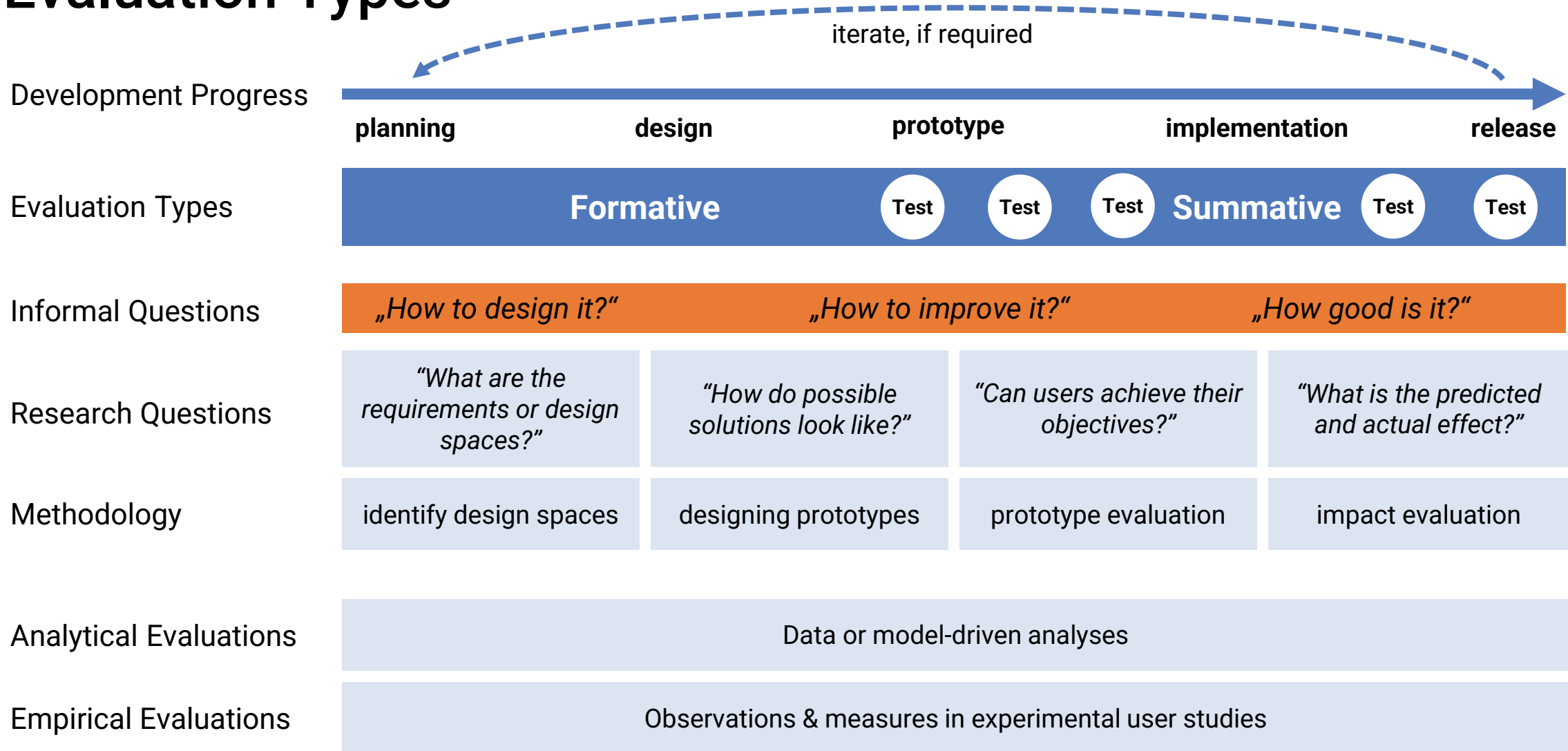
[4] Hurteau, M.; Houle, S.; Mongiat, S. (2009). "How Legitimate and Justified are Judgments in Program Evaluation?". Evaluation. 15 (3): 307–319. doi:10.1177/1356389009105883. S2CID 145812003.

Why do we need research or science to evaluate?

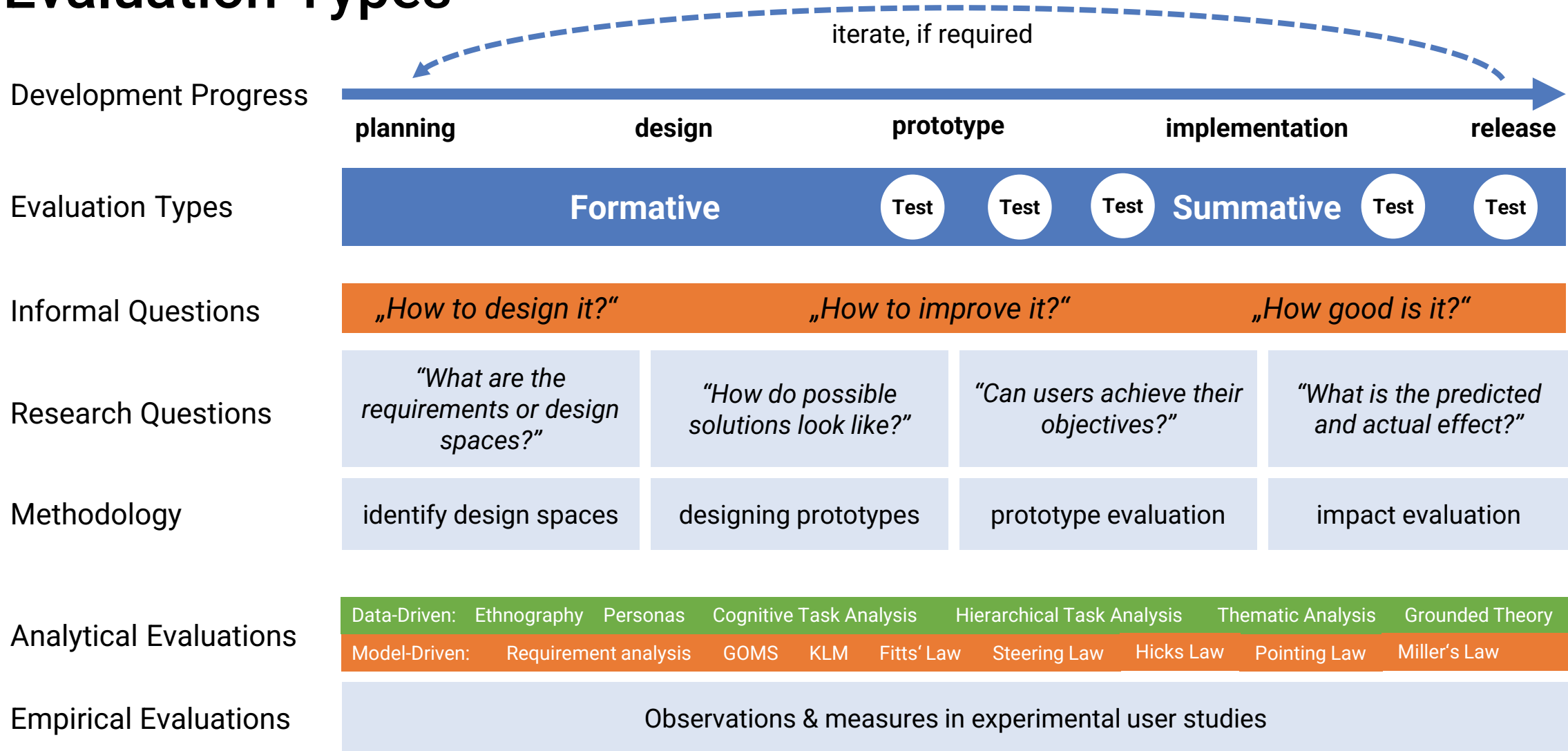
- To gain **objective knowledge** we need **standardized methods** to measure predetermined concepts (e.g., the *effectiveness* of the axe)
- **Standardized methods to collect and evaluate data emerge from science**
 - › not from e.g., companies, governments, individuals, etc.
- **Only** the correct application of **scientific methods ensure that** the **results** are **comprehensible, reliable, replicable, and verifiable** (validity and reliability)
 - › Important when we iterate the design to improve our product: we can understand the impact of changes
 - › How can we evaluate using scientific methods?

Ross, P.H.; Ellipse, M.W.; Freeman, H.E. (2004). Evaluation: A systematic approach (7th ed.). Thousand Oaks: Sage. ISBN 978-0-7619-0894-4.

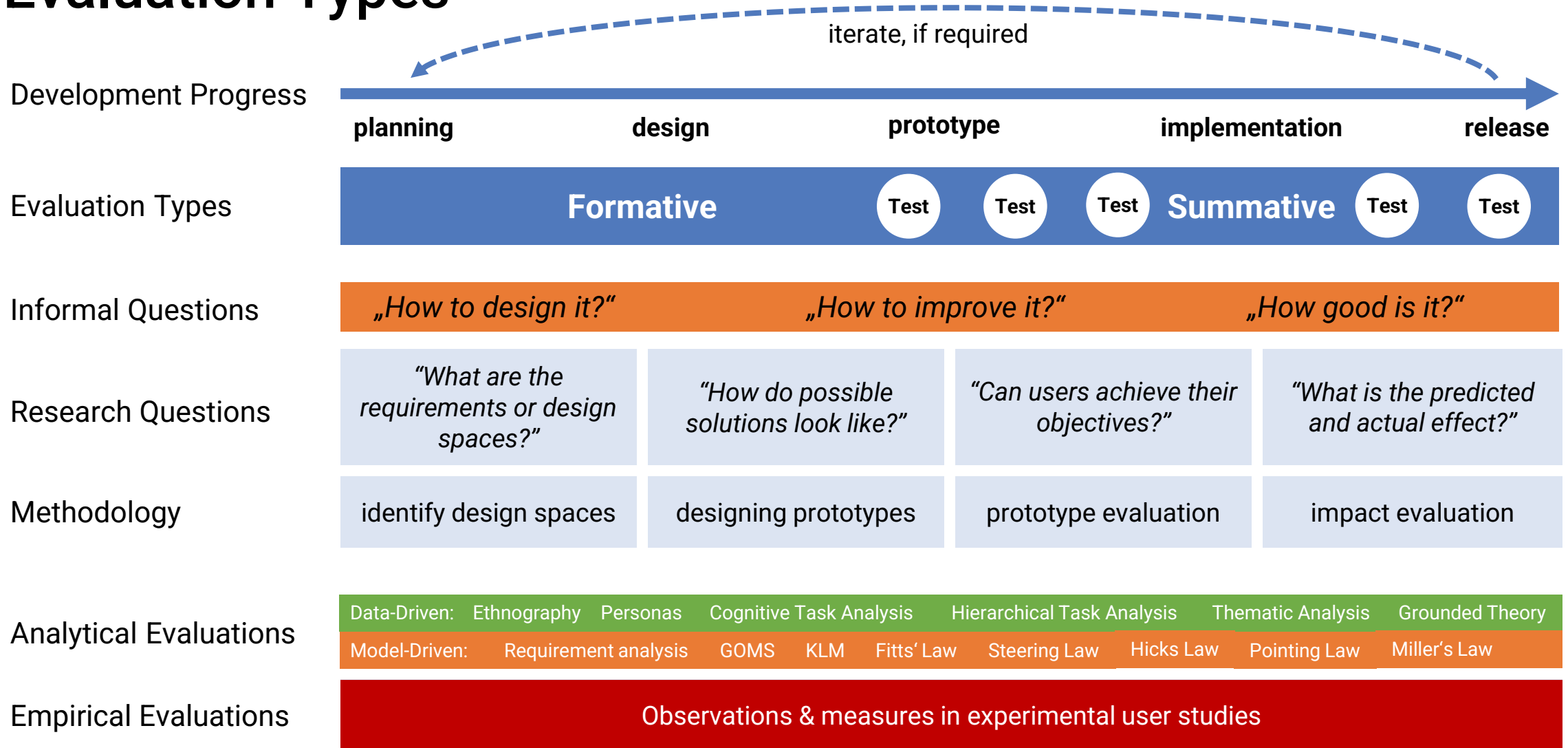
Evaluation Types



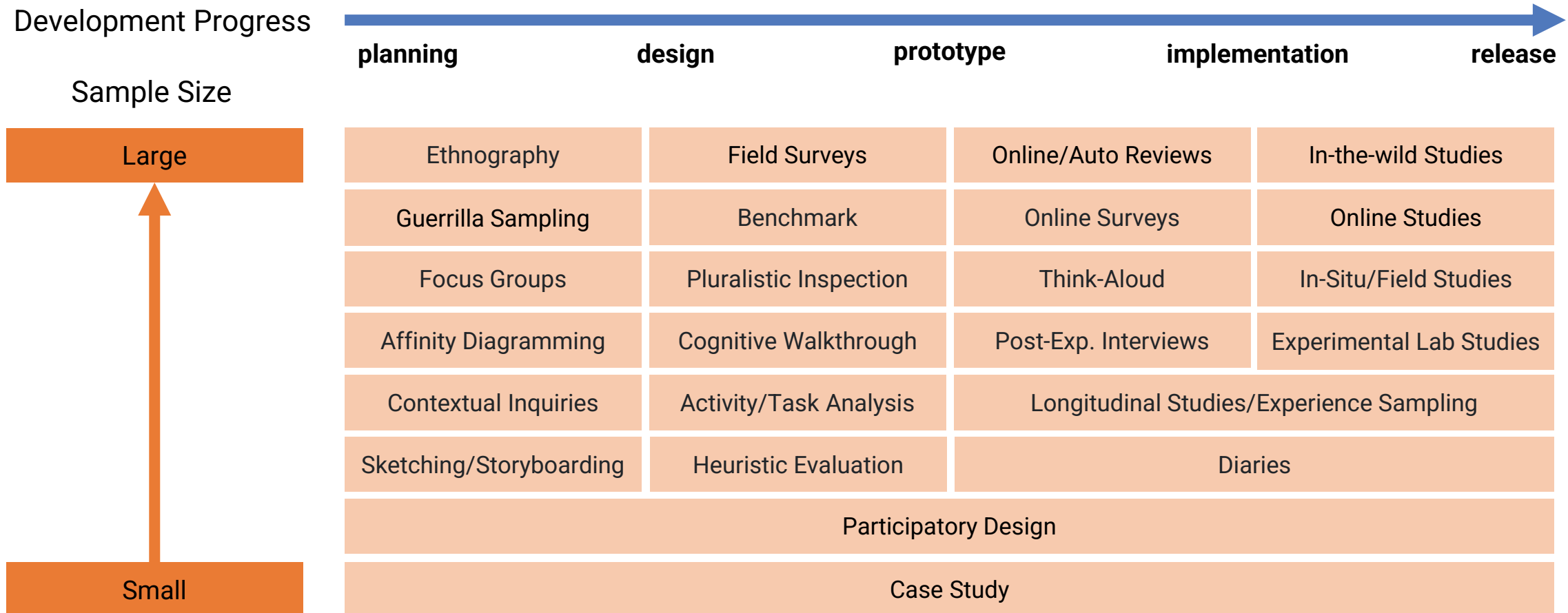
Evaluation Types



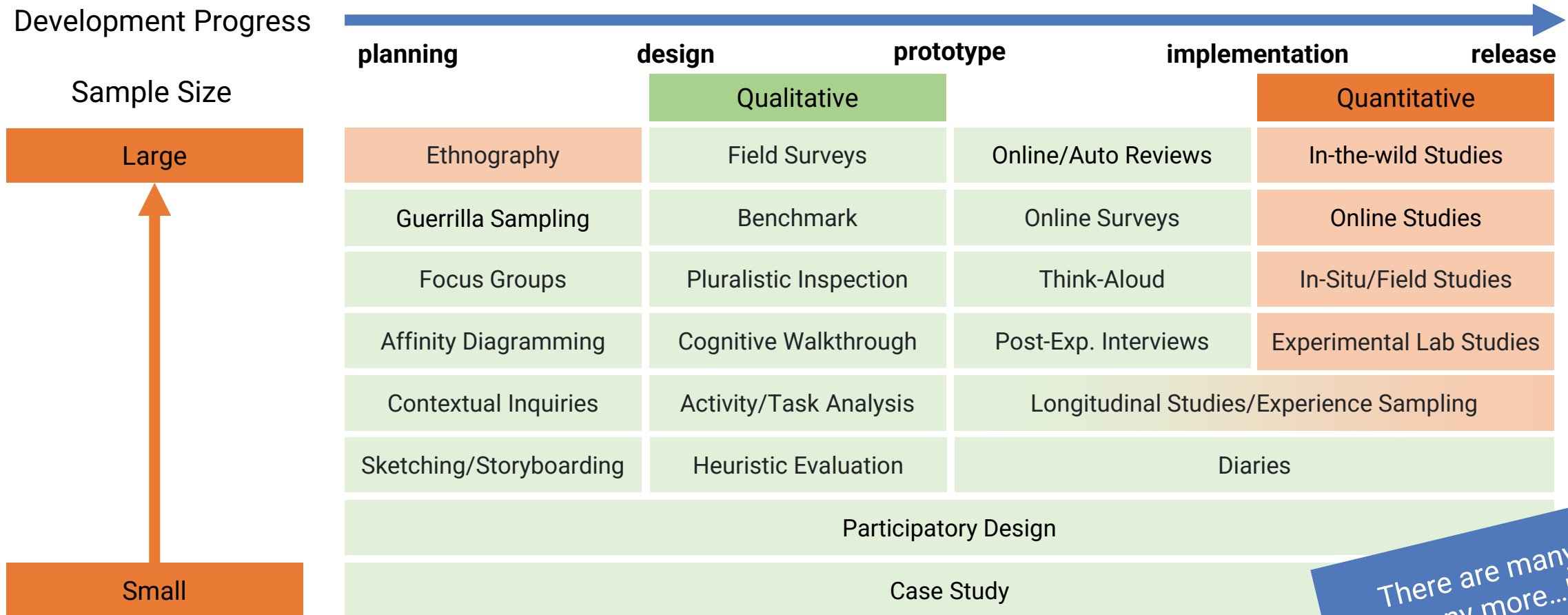
Evaluation Types



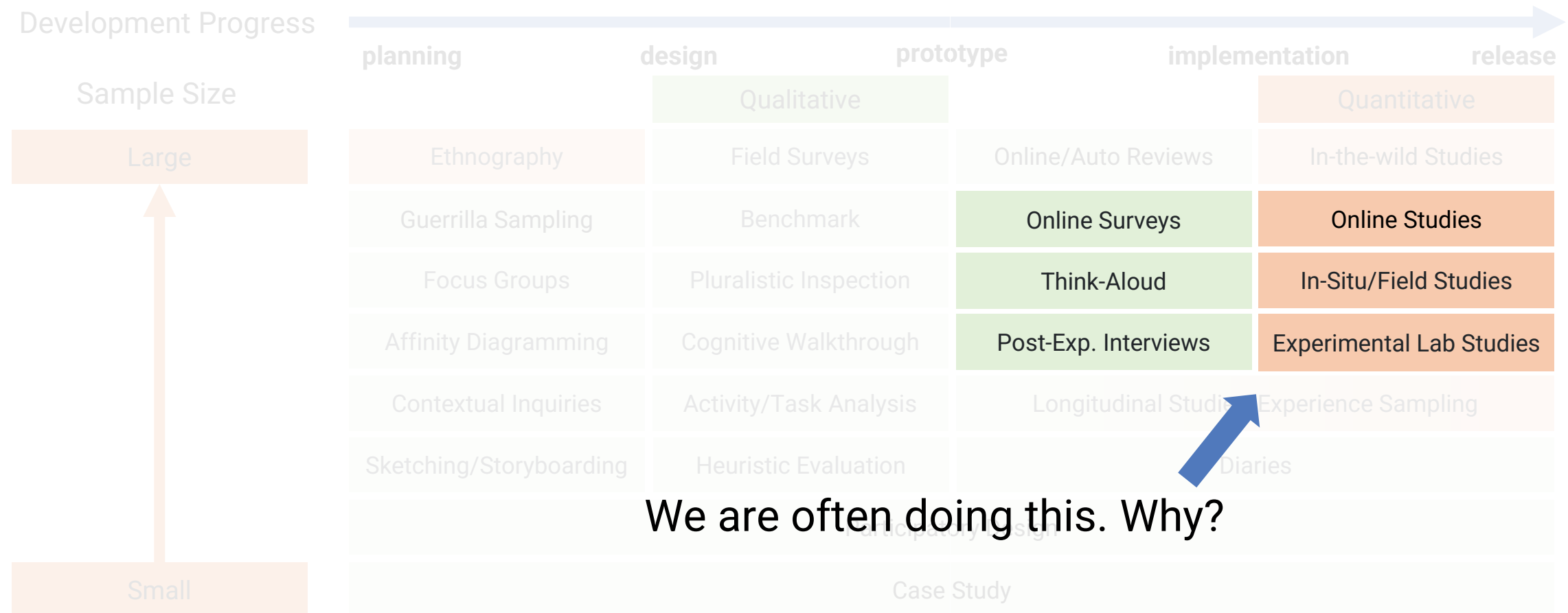
Empirical Evaluations in HCI



Qualitative and Quantitative Evaluations in HCI



Qualitative and Quantitative Evaluations in HCI



Experimental Evaluations

- *“An experiment is a methodical investigation for the empirical extraction of information (data)” [1] or “an ‘interrogation’ of nature” [2]*
- Experimental evaluations...
 - › ...are fundamental in HCI research
 - › ...allow us to assess the impact of a system on users
 - › ...allow us to improve a system
 - › ...can be quantitative or qualitative (or both!)
 - › ...must be carefully designed to draw no wrong conclusions!
 - › ...seek for high internal and external validity ?

[1] en.wikipedia.org/wiki/Experiment

[2] Brockhaus Encyclopedia, 19th edition, Mannheim 1988, Keyword "experiment".

Exercise

- Find your method(s): <https://hci-studies.org/methods-and-measures/>
- Justify whether and why it is the best for your study
- Find a source (not Wikipedia) describing how it works
- Read it and add it to your problem statement